Balance Activities for LE Amputees
Amputation and Balance

- “Amputation impairs the ability to balance.”

- “Confidence in a person's balance has been shown to be an important predictor of social activity among people with lower-limb amputations.”

- An individual’s confidence in balance may better determine whether or not the individual will engage in their daily, social and physical activities.

- Fear of falling is an important factor in a patient’s balance confidence.

US National Library of Medicine, National Institutes of Health (2011)
Low Balance Confidence

Preliminary studies show a correlation between balance confidence and:

- Reduced prosthetic capability
- Reduced prosthetic mobility
- Reduced participation in social activities

Low Balance Confidence

This reduced capability, mobility and participation in social activities can lead to a further development of impairments that accompany inactivity, such as:

- Loss of muscle strength
- Loss of endurance
- Loss of balance capability

A physical therapy balance program for the amputee should include:

- Single-leg stance balance and stability to ensure safe, functional mobility without the use of a prosthesis, as well as to prepare for gait training (for a unilateral amputee).

- Sitting balance activities on a stability ball or bolster can assist in gaining trunk stability in bilateral amputees prior to their use of prostheses.

Journal of the American Podiatric Medical Association (2001)
Essential Elements for Balance

When incorporating balance activities during physical therapy, the individual must:

- Develop a good sense of balance over both feet.
- Maintain equal weight bearing through both lower limbs.
- Learn to use their muscles in the socket, knee and hip quickly and efficiently (timing is key).
- Continue to keep their body weight over their prosthetic limb long enough to fully deflect the prosthetic foot for maximum “energy release” during gait.
- Develop agility by practicing moving in multiple directions while wearing the prosthesis which forces the use their muscles in a variety of situations.
- Practice, practice, practice.

Amputee-Coalition (2008)
Balance Exercises
_Courtesy of Amputee-Coalition.org (2008)_

**Exercise #1**

*Side-to-Side Balance:* Stand between two chairs, if possible facing a full-length mirror. Place one hand on the back of each chair. Your feet should be approximately two to four inches apart. Shift your body weight from right to left. Note how the pressure changes on your residual limb within the prosthetic socket when you put weight on it and become familiar with the movements throughout your legs. Work toward maintaining your balance using the muscles within the socket, and, eventually eliminate the use of the hand supports.
Balance Exercises

_Courtesy of Amputee-Coalition.org (2008)_

**Exercise #2**

**Forward and Backward Balance:**
The same exercise can be performed shifting your body weight forward and backward, beginning with small movements and progressing slowly to larger movements. You should continue to be aware of the pressure changes on your residual limb within the socket as you move, and use your muscles as previously described. If you shift your weight too far backward (over the heels) simply raise both arms forward and bend forward at the hips. If you shift your weight too far forward (over the toes), simply stretch both arms behind you and arch your back.
Exercise #3

**Single-Limb Balance:** As you become comfortable with maintaining your balance and sharing the weight between both legs when standing on two feet, you must begin to get comfortable standing on the prosthesis alone. Stand between the two chairs, with a small step stool placed in front of your unaffected or sound limb. Place both hands on the backs of the chairs and step onto the stool with your unaffected limb as slowly as possible. Repeat this movement several times until you feel comfortable with it. Then, remove your unaffected-side hand from the chair. Again, slowly step onto the stool with your unaffected limb. Once you can perform this movement slowly, remove both your hands from the chairs, and continue stepping onto the stool in a slow and controlled manner. (Continued on next page)
Exercise #3 (Continued)

Single-Limb Balance:
At first, you will have difficulty stepping with your unaffected limb in a slow, controlled manner and maintaining your balance over the prosthesis during this exercise. This is largely due to the lack of strength and coordination in the hip of your residual limb. Concentrate on controlling your prosthetic limb, rather than simply moving your unaffected limb slowly. Focus on the following three items when you are stepping up: 1. Control your hip on the prosthetic side by tightening your hip muscles. 2. Increase the weight bearing into the socket by allowing your full body weight to be placed down into the socket. 3. Visualize controlling the movement of the prosthetic foot.
Balance Exercises
Courtesy of Amputee-Coalition.org (2008)

Exercise #4

Side Stepping: Stand at one end of a kitchen counter or at a long sturdy table. Face the counter and place both hands on it for support. Begin by sidestepping to your unaffected side. Try to concentrate on keeping your hips even with each other and not leaning way over your prosthetic limb as you move your unaffected limb.
Balance Exercises

*Courtesy of Amputee-Coalition.org (2008)*

**Exercise #5**

**Braiding:** From the standing position with your feet comfortably apart, cross your prosthetic limb in front of your unaffected limb, then bring your unaffected limb from behind to return to your original standing position. From the standing position, cross your prosthetic limb behind your unaffected limb, then bring your unaffected limb across your prosthetic limb, returning to your original standing position. Repeat, alternating each step as you move sideways. Use your arms and rotate your trunk to assist you with your balance. As you become comfortable with these maneuvers, increase your speed.
Balance Exercises
*Courtesy of Amputee-Coalition.org (2008)*

**Exercise #6**

**Ball Rolling:** Stand with a tennis ball in front of your unaffected limb. Place your unaffected foot on top of the ball. Keep your foot flat on the ball and roll it forward, backward, side-to-side or in circles. Feel the muscles working in the prosthetic-side hip as your weight shifts with the movements of your unaffected foot.
Balance Exercises
Courtesy of Amputee-Coalition.org (2008)

Exercise #7

Resisted Elastic Kicks: You will need a sturdy, immovable table or sofa leg and some rubber tubing. Secure one end of the rubber tubing to a sturdy table leg and place the other end around the ankle of your unaffected leg. Holding on to a chair, move far enough away from the table to slightly stretch the rubber tubing. Then do the following exercises: 1. Kick your leg back, while facing the table. 2. Kick across the prosthetic limb. 3. Kick away from the prosthetic limb. 4. Kick forward with your back to the table, holding on to the table for balance. 5. Kick your unaffected limb back so the rubber tubing is stretched out.
Balance Exercises
Courtesy of Amputee-Coalition.org (2008)

Exercise #8

Toe Box Jumps: Place four pieces of tape two feet apart, forming a square. Standing with both feet together, jump diagonally to the opposite mark landing on the toe of the prosthetic foot, using your unaffected limb for balance. As your body weight loads the prosthetic foot, quickly push off using your thigh muscles, aiming for the mark just to the side. Again landing on the toe of the prosthetic limb and balancing with the unaffected limb, push off diagonally to the last remaining mark.
Balance Exercises
*Courtesy of Amputee-Coalition.org (2008)*

**Exercise #9**

**Resisted Walking**: A partner is required to assist with this exercise. Place a belt around your waist with an elastic cord looped through the belt. Walk along a flat surface, as your partner offers resistance with the cord. As you walk, feel your muscles working in the socket, your body weight passing over the prosthetic foot, the deflection of the prosthetic foot lever as your body weight moves over the toe, and the spring effect of your prosthetic limb as it leaves the ground and begins to advance forward.
Balance Exercises
_Courtesy of Amputee-Coalition.org (2008)_

**Exercise #10**

**Agility Drills:** Line up four to six cones or cups in two rows approximately six feet apart. Quickly move from one cone to another squatting down to touch each cone as you zigzag through them. The key to this exercise is maintaining speed by staying on the toe of the prosthetic foot and using the thigh or hip muscle to rapidly extend the prosthetic limb as you turn or come up from the squatting position.
References

- “September 2002<"http://ptjournal.apta.org/content/82/9/856.full”>